
N O T E S
ON THE
E S T A B L I S M E N T
O F A
M O N E Y U N I T,
A N D O F A
C O I N A G E F O R T H E U N I T E D S T A T E S.

I N fixing the Unit of Money, these circumstances are of principal importance.

I. That it be of *convenient size* to be applied as a measure to the common money transactions of life.

II. That its parts and multiples be in *an easy proportion* to each other, so as to facilitate the money arithmetic.

III. That the unit and its parts or divisions be *so nearly of the value of some of the known coins*, as that they may be of easy adoption for the people.

The Spanish dollar seems to fulfil all these conditions.

I. Taking into our view all money transactions, great and small, I question if a common measure of more *con-*

venient size than the dollar could be proposed. The value of 100, 1000, 10,000 dollars is well estimated by the mind. So is that of the tenth or the hundredth of a dollar. Few transactions are above or below these limits. The expediency of attending to the size of the money unit will be evident to any one who will consider how inconvenient it would be to a manufacturer or merchant, if, instead of the yard for measuring cloth, either the inch or the mile had been made the unit of measure.

II. The most *easy ratio* of multiplication and division is that by ten. Every one knows the facility of decimal arithmetic. Every one remembers, that, when learning money-arithmetic, he used to be puzzled with adding the farthings, taking out the fours and carrying them on; adding the pence, taking out the twelves, and carrying them on; adding the shillings, taking out the twenties and carrying them on. But when he came to the pounds, where he had only tens to carry forward, it was easy and free from error. The bulk of mankind are school boys thro' life. These little perplexities are always great to them. And even mathematical heads feel the relief of an easier substituted for a more difficult process. Foreigners too who trade or travel among us, will find a great facility in understanding our coins and accounts from this ratio of subdivision. Those who have had occasion to convert the livres, sols and deniers of the French, the gilders, stivers and penings of the Dutch, the pounds, shillings, pence and farthings of these several states into each other, can judge how much they would have been aided had their several subdivisions been in a decimal ratio. Certainly in all cases where we are free to chuse between easy and difficult modes of operation, it is most rational to chuse the easy. The Financier, therefore, in his report, well proposes that our coins should be in decimal proportions to one another. If we adopt the dollar for our unit, we should strike four coins, one of gold, two of silver, and one of copper: viz.

1. A golden piece equal in value to 10 dollars.
2. The unit, or dollar, of silver.
3. The tenth of a dollar, of silver also.

4. The hundredth of a dollar, of copper.
Compare the arithmetical operations on the same sum of money expressed in this form, and expressed in the pound sterling and its divisions.

	l.	s.	d.	qrs.	Dollars.
Addition.	8	13	11	$\frac{1}{2}$	= 38.65
	4	12	8	$\frac{3}{4}$	= 20.61
	13	6	8	$\frac{1}{4}$	= 59.26

	l.	s.	d.	qrs.	Dollars.
Subtraction.	8	13	11	$\frac{1}{2}$	= 38.65
	4	12	8	$\frac{3}{4}$	= 20.61
	4	1	2	$\frac{3}{4}$	= 18.04

Multiplication by 8.

l.	s.	d.	qrs.	Dollars.
8	13	11	$\frac{1}{2}$	= 38.65
20				8

173
12

309.2	D.
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2087

4

8350
8

66,800

16,700

139		1	---	8
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l. 69		11	---	8
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$\frac{8}{4}$
$\frac{1}{12}$

Division by 8.

l. s. d. qrs.	Dollars.
8 13 11 $\frac{1}{2}$	= 8 38.65
20	4.83
<hr/>	
173	
12	
<hr/>	
2087	
4	
<hr/>	
8) 8350 (1043	qrs.
<hr/>	
35 $\frac{1}{4}$ 260 -- -- $\frac{3}{4}$	
<hr/>	
30 $\frac{1}{12}$ 211 -- 8	
<hr/>	
6 1. 111 -- 8 -- $\frac{3}{4}$	
<hr/>	
8	

A bare inspection of the above operations will evince the labour which is occasioned by subdividing the unit into 20ths, 240ths, and 960ths, as the English do, and as we have done ; and the ease of subdivisions in a decimal ratio. The same difference arises in making payment. An Englishman, to pay 8l. 13s. 11d. $\frac{1}{2}$ qrs. must find by calculation what combination of the coins of his country will pay this sum. But an American, having the same sum to pay, thus expressed 38.65 Dollars, will know by inspection only, that 3 golden pieces, 8 units or dollars, 6 tenths and five coppers pay it precisely.

III. The third condition required, is that the unit, its multiples, and subdivisions coincide in value with some of the known coins so nearly, that the people may, by a quick reference in the mind, estimate their value. If this be not attended to, they will be very long in adopting the innovation, if ever they adopt it. Let us examine in this point of view each of the four coins proposed.

1. The golden piece will be $\frac{1}{5}$ more than a half Joe, and $\frac{1}{15}$ more than a double guinea. It will be readily estimated then by reference to either of them ; but more readily and accurately as equal to 10 dollars.

2. The unit or dollar is a known coin, and the most familiar of all to the minds of the people. It is already adopted from South to North ; has identified our currency, and therefore happily offers itself as an unit already introduced. Our public debt, our requisitions, and their apportionments have given it actual and long possession of the place of unit. The course of our commerce too will bring us more of this than of any other foreign coin, and therefore renders it more worthy of attention. I know of no unit which can be proposed in competition with the dollar, but the pound. But what is the pound ? 1547 grains of fine silver in Georgia ; 1289 grains in Virginia, Connecticut, Rhode island, Massachusets, and New Hampshire ; $1031\frac{1}{4}$ grains in Maryland, Delaware, Pennsylvania, and New Jersey ; $966\frac{3}{4}$ grains in North Carolina and New York. Which of these shall we adopt ? To which state give that pre-eminence, of which all are so jealous ? And on which impose the difficulties of a new estimate for their corn, their cattle, and other commodities ? Or shall we hang the pound sterling, as a common badge, about all their necks ? This contains $1718\frac{3}{4}$ grains of pure silver. It is difficult to familiarize a new coin to the people. It is more difficult to familiarize them to a new coin with an old name. Happily the dollar is familiar to them all ; and is already as much referred to for a measure of value as their respective provincial pounds.

3. The Tenth will be precisely the Spanish bit, or half pistereen. This is a coin familiar to us all. When we shall make a new coin then equal in value to this, it will be of ready estimate with the people.

4. The hundredth, or copper, will differ little from the copper of the four Eastern states, which is $\frac{1}{108}$ of a dollar ; still less from the penny of New York and North Carolina which is $\frac{1}{96}$ of a dollar : and somewhat more from the penny or copper of Jersey, Pennsylvania, Delaware and Maryland, which is $\frac{1}{90}$ of a dollar. It will then be about

the medium between the old and the new coppers of these states, and therefore will soon be substituted for them both. In Virginia coppers have never been in use, It will be as easy therefore to introduce them there of one value as of another. The copper coin proposed will be nearly equal to three fourths of their penny, which is the same with the penny lawful of the Eastern states.

A great deal of small change is useful in a state, and tends to reduce the prices of small articles. Perhaps it would not be amiss to coin 3 supplementary pieces of silver, one of the value of five tenths, or half a dollar, one of the value of two tenths, which would be equal to the Spanish pistereen, and one of the value of five coppers, which would be equal to the Spanish half bit. We should then have five silver coins, viz.

1. The unit or dollar.
2. The half dollar or five tenths.
3. The double tenth, equal to .2, or $\frac{1}{5}$ of a dollar, or to the pistereen.
4. The tenth, equal to a Spanish bit.
5. The five copper piece equal to .05 or $\frac{1}{20}$ of a dollar, or to the half bit.

The plan reported by the Financier is worthy of his sound judgment. It admits however of objection in the size of the unit. He proposes that this shall be the 1440th part of a dollar: so that it will require 1440 of his units to make the one before proposed. He was led to adopt this by a mathematical attention to our old currencies all of which this unit will measure without leaving a fraction. But as our object is to get rid of these currencies, the advantage derived from this coincidence will soon be past, whereas the inconveniencies of this unit will for ever remain, if they do not altogether prevent its introduction. It is defective in two of the three requisites of a money unit.

1. It is inconvenient in its application to the ordinary money transactions. 10,000 dollars will require 8 figures to express them, to wit, 14,400,000 units. A horse or bullock, of 80 dollars value, will require a notation of six figures, to wit, 115,200 units. As a money of account

this will be laborious, even when facilitated by the aid of decimal arithmetic: as a common measure of the value of property, it will be too minute to be comprehended by the people. The French are subjected to very laborious calculations, the livre being their ordinary money of account, and this but between $\frac{1}{5}$ and $\frac{1}{6}$ of a dollar. But what will be our labours, should our money of account be $\frac{1}{1440}$ th of a dollar only?

2. It is neither equal, nor near to any of the known coins in value.

If we determine that a dollar shall be our unit, we must then say with precision what a dollar is. This coin, as struck at different times, of different weights and fineness, is of different values. Sir Isaac Newton's assay and representation to the Lords of the Treasury in 1717 of those which he examined, made their values as follows:

	dwt. grs.	grains.	
The Seville piece of eight,	17 12	387	of pure sil-
The Mexico piece of eight,	17 10 $\frac{5}{9}$	385 $\frac{1}{2}$	ver.
The Pillar piece of eight,	17 9	385 $\frac{3}{4}$	
The new Seville piece of eight,	14 0	308 $\frac{7}{10}$	

The Financier states the old dollar as containing 376 grains of fine silver, and the new 365 grains. If the dollars circulating among us be of every date equally, we should examine the quantity of pure metal in each, and from them form an average for our unit. This is a work proper to be committed to Mathematicians as well as Merchants, and which should be decided on actual and accurate experiment.

The quantum of alloy is also to be decided. Some is necessary to prevent the coin from wearing too fast. Too much would fill our pockets with copper instead of silver. The silver coins assayed by Sir Isaac Newton varied from 1 $\frac{1}{2}$ to 76 penny-weight alloy in the pound Troy of mixed metal. The British standard has 18 dwt. The Spanish coins assayed by Sir Isaac Newton have from 18 to 19 $\frac{1}{2}$ dwt. The new French crown has in fact 19 $\frac{1}{2}$, though by edict it should have 20 dwt. that is $\frac{1}{15}$. The taste of our countrymen will require that their furniture plate should be as good as the British standard. Taste cannot be controuled

by law. Let it then give the law in a point which is indifferent to a certain degree. Let the legislatures fix the alloy of furniture plate at 18 dwt. the British standard, and Congress that of their coin at one ounce in the pound, the French standard. This proportion has been found convenient for the alloy of gold coin, and it will simplify the system of our mint to alloy both metals in the same degree. The coin too being the least pure, will be less easily melted into plate. These reasons are light indeed, and of course will only weigh if no heavier ones can be opposed to them.

The proportion between the values of gold and silver is a mercantile problem altogether. It would be inaccurate to fix it by the popular exchanges of a half Joe for eight dollars, a Louis for four French crowns, or five Louis for twenty-three dollars. The first of these would be to adopt the Spanish proportion between gold and silver; the second the French; the third a mere popular barter, wherein convenience is consulted more than accuracy. The legal proportion in Spain is 16 for 1, in England $15 \frac{1}{2}$ for 1, in France 15 for 1. The Spaniards and English are found in experience to retain an over-proportion of gold coins and to lose their silver. The French have a greater proportion of silver. The difference at market has been on the decrease. The Financier states it at present as at $14 \frac{1}{2}$ for 1. Just principles will lead us to disregard legal proportions altogether; to enquire into the market price of gold in the several countries with which we shall principally be connected in commerce, and to take an average from them. Perhaps we might with safety lean to a proportion somewhat above par for gold, considering our neighbourhood and commerce with the sources of the coins, and the tendency which the high price of gold in Spain has to draw thither all that of their mines, leaving the silver principally for our, and other markets.

It is not impossible that 15 for 1, may be found an eligible proportion. I state it however as conjectural only.

As to the alloy for gold coin, the British is an ounce in the pound; the French, Spanish, and Portuguese differ

from that only from a quarter of a grain to a grain and a half. I should therefore prefer the British, merely because its fraction stands in a more simple form, and facilitates the calculations into which it enters.

Should the unit be fixed at 365 grains of pure silver, gold at 15 for 1, and the alloy of both be one twelfth, the weights of the coins will be as follows :

The golden piece, containing $243\frac{1}{3}$ grains of pure metal, --- 22.12 grains of alloy, will weigh 11 dwt. 1.45 grs.

The unit or dollar, containing 365 grs. of pure metal, 33.18 grs. of alloy, will weigh 16 dwt. 14.18 grs.

The half dollar, or five tenths, containing $182\frac{1}{2}$ of pure metal, --- 16.59 grs. of alloy, will weigh 8 dwt. 7.09 grs.

The fifth, or pistereen, containing 73 grains of pure metal, --- 6.63 grs. of alloy, will weigh 3 dwt. 7.63 grs.

The tenth, or bit, containing $36\frac{1}{2}$ grs. of pure metal, --- 3.318 grs. of alloy, will weigh 1 dwt. 15 818 grs.

The twentieth, or half bit, containing $18\frac{1}{4}$ grs. of pure metal, --- 1.659 grs. of alloy, will weigh 19.9 grs.

The quantity of fine silver which shall constitute the unit being settled, and the proportion of the value of gold to that of silver; a table should be formed from the assay before suggested, classing the several foreign coins according to their fineness, declaring the worth of a penny-weight or grain in each class, and that they shall be lawful tenders at those rates, if not clipped or otherwise diminished; and where diminished, offering their value for them at the mint, deducting the expence of re-coinage. Here the legislatures should co-operate with Congress in providing that no money be received or paid at their treasuries, or by any of their officers, or any bank, but on actual weight; in making it criminal in a high degree to diminish their own coins, and in some smaller degree to offer them in payment when diminished.

That this subject may be properly prepared and in readiness for Congress to take up at their meeting in November, something must now be done. The present session drawing to a close, they probably would not chuse to enter far into this undertaking themselves. The com-

mittee of the states however, during the recess, will have time to digest it thoroughly, if Congress will fix some general principles for their government. Suppose then they be instructed

To appoint proper persons to assay and examine, with the utmost accuracy practicable, the Spanish milled dollars of different dates in circulation with us.

To assay and examine in like manner the fineness of all other the coins which may be found in circulation within these states.

To report to the Committee the result of these assays, by them to be laid before Congress.

To appoint also proper persons to enquire what are the proportions between the values of fine gold and fine silver at the markets of the several countries with which we are or probably may be connected in commerce; and what would be a proper proportion here, having regard to the average of their values at those markets and to other circumstances, and to report the same to the Committee, by them to be laid before Congress.

To prepare an ordinance for establishing the unit of money within these states; for subdividing it, and for striking coins of gold, silver, and copper, on the following principles.

That the money unit of these states shall be equal in value to a Spanish milled dollar, containing so much fine silver as the assay before directed shall shew to be contained on an average in dollars of the several dates in circulation with us.

That this unit shall be divided into tenths and hundredths.

That there shall be a coin of silver of the value of an unit.

One other of the same metal of the value of one tenth of an unit.

One other of copper of the value of the hundredth of an unit.

That there shall be a coin of gold of the value of ten units, according to the report before directed and the judgment of the Committee thereon.

That the alloy of the said coins of gold and silver shall be equal in weight to one eleventh part of the fine metal.

That there be proper devices for these coins.

That measures be proposed for preventing their diminution, and also their currency, and that of any others when diminished.

That the several foreign coins be described and classed in the said ordinance, the fineness of each class stated, and its value by weight estimated in units and decimal parts of units.

And that the said draught of an ordinance be reported to Congress at their next meeting for their consideration and determination.

Annapolis, April, 1784.

Supplementary Explanations.

THE preceding notes having been submitted to the consideration of the Financier, he favored me with his opinion and observations on them, which render necessary the following supplementary explanations.

I observed in the preceding notes, that the true proportion of value between gold and silver was a mercantile problem altogether, and that perhaps 15 for 1 might be found an eligible proportion. The Financier is so good as to inform me, that this would be higher than the market would justify, Confident of his better information on this subject, I recede from that idea.*

He also informs me, that the several coins in circulation among us have been already assayed with accuracy,

* In a Newspaper, which frequently gives good details in political œconomy, I find, under the Hamburg head, that the present market price of gold and silver, is, in England 15.5 for 1 : in Russia 15 : in Holland 14.75 : in Savoy 14.6 : in France 14.42 : in Spain 14.3 : in Germany 14.155. The average of which is 14.675 or 14 5-8ths. I would still incline to give a little more than the market price for gold, because of its superior convenience in transportation.

and the result published in a work on that subject. The assay of Sir Isaac Newton had superseded, in my mind, the necessity of this operation as to the older coins, which were the subject of his examination. This latter work, with equal reason, may be considered as saving the same trouble as to the latter coins.

So far then I accede to the opinions of the Financier. On the other hand, he seems to concur with me in thinking his smallest fractional division too minute for an unit, and therefore proposes to transfer that denomination to his largest silver coin, containing 1000 of the units first proposed, and worth about $4\frac{1}{2}$ lawful, or $\frac{25}{8}$ of a dollar. The only question then remaining between us, is whether the dollar, or this coin, be best for the unit. We both agree that the *ease of adoption with the people* is the thing to be aimed at.

1. As to the dollar, events have overtaken and superseded the question. It is no longer a doubt whether the people can adopt it with ease. They have actually adopted it, and will be to be turned out of that into another tract of calculation, if another unit be assumed. They have now two units, which they use with equal facility, viz. the pound of their respective state, and the dollar. The first of these is peculiar to each state: the second happily common to all. In each state the people have an easy rule for converting the pound of their state into dollars, or dollars into pounds. And this is enough for them without knowing how this may be done in every state of the union. Such of them as live near enough the borders of their state to have dealings with their neighbours, learn also the rule of their neighbours. Thus in Virginia, and the Eastern states, where the dollar is $\frac{1}{3}$ or $\frac{3}{10}$ of a pound, to turn pounds into dollars, they multiply by 10 and divide by 3: to turn dollars into pounds, they multiply by 3 and divide by ten. Those in Virginia who live near to Carolina, where the dollar is $\frac{8}{10}$ or $\frac{4}{5}$ of a pound, learn the operation of that state, which is a multiplication by 4, and division by 10, et c. converso. Those who live near Maryland, where the dollar is $\frac{7}{6}$ or $\frac{7}{8}$ of a pound, multi-

ply by 3 and divide by 8, or e converso. All these operations are easy, and have been found by experience not too much for the arithmetic of the people, when they have occasion to convert their old unit into dollars, or the reverse.

2. As to the unit of the Financier, in the states where the dollar is $\frac{3}{10}$ of a pound, this unit will be $\frac{5}{24}$. Its conversion into the pound then will be by a multiplication by 5 and division by 24. In the states where the dollar is $\frac{3}{8}$ of a pound, this unit will be $\frac{25}{96}$ of a pound, and the operation must be to multiply by 25 and divide by 96, or e converso. Where the dollar is $\frac{4}{10}$ of a pound, this unit will be $\frac{5}{18}$. The simplicity of the fraction, and of course the facility of conversion and reconversion, is therefore against this unit, and in favour of the dollar, in every instance. The only advantage it has over the dollar is, that it will in every case express our farthings without a remainder; whereas, though the dollar and its decimals will do this in many cases, it will not in all. But, even in these, by extending your notation one figure further, to wit, to thousandths, you approximate to perfect accuracy within less than the two thousandth part of a dollar, an atom in money which every one would neglect. Against this single inconvenience the other advantages of the dollar are more than sufficient to preponderate.---This unit will present to the people a new coin, and whether they endeavour to estimate its value by comparing it with a pound, or with a dollar, the units they now possess, they will find the fraction very compound, and of course less accommodated to their comprehension and habits than the dollar. Indeed the probability is that they could never be led to compute in it generally.

The Financier supposes that the $\frac{1}{100}$ of a dollar is not sufficiently small where the poor are purchasers or vendors. If it is not, make a smaller coin. But I suspect that it is small enough. Let us examine facts, in countries where we are acquainted with them. In Virginia, where our towns are few, small, and of course their demand for necessaries very limited, we have never yet been

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able to introduce a copper coin at all. The smallest coin which any body will receive there is the half bit, or $\frac{1}{20}$ of a dollar. In those states where the towns are larger and more populous, a more habitual barter for small wants has called for a copper coin $\frac{1}{90}$ or $\frac{1}{96}$ or $\frac{1}{108}$ of a dollar. In England where the towns are many and populous, and where ages of experience have matured the conveniencies of intercourse, they have found that some wants may be supplied for a farthing, or $\frac{1}{208}$ of a dollar, and they have accommodated a coin to this want. This business is evidently progressive. In Virginia we are far behind. In some other states they are farther advanced, to wit, to the appreciation of $\frac{1}{90}$, $\frac{1}{96}$, $\frac{1}{108}$ of a dollar. To this most advanced state then I accommodated my smallest coin in the decimal arrangement as a *money of payment*, corresponding with the *money of account*. I have no doubt the time will come when a smaller coin will be called for. When it comes, let it be made. It will probably be the half of the copper I propose, that is to, say $\frac{5}{1000}$ or .005 of a dollar, this being nearly the farthing of England. But it will be time enough to make it when the people shall be ready to receive it.

My proposition then is that our notation of money shall be decimal, descending ad libitum of the person noting; that the unit of this notation shall be a dollar, that coins shall be accommodated to it from ten dollars to the hundredth of a dollar; and that to set this on foot, the resolutions be adopted which were proposed in the Notes, only substituting an *enquiry into the fineness of the coins*, in lieu of an *assay* of them.

Annapolis, May 9, 1784.

F I N I S.